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Method of penalization for the state equation for an elliptical optimal control problem

Lapin A., Zalyalov D.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2015, Allerton Press, Inc. We solve by finite difference method an optimal control problem of a system governed by a linear elliptic equation with pointwise control constraints and non-local state constraints. A discrete optimal control problem is approximated by a minimization problem with penalized state equation. We derive the error estimates for the distance between the exact and regularized solutions. We also prove the rate of convergence of block Gauss–Seidel iterative solution method for the penalized problem. We present and analyze the results of the numerical experiments.

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Keywords

constraint saddle point problem, finite difference approximation, iterative methods, optimal control